

THE ADDRESS.

GENTLEMEN, GRADUATES :

It is recorded of the immortal Newton that, whilst contemplating the simplicity and harmony of the laws by which the universe is governed, as manifested in the relations which his gigantic mind developed between the distant and apparently unconnected masses of the planetary system, his thoughts glanced towards the organized creation; and reflecting that the wonderful structure and arrangement which they exhibit, present in no less a degree the indications of the order and perfection which can result from Omnipotence alone, he remarked, "I cannot doubt that the structure of animals is governed by principles of similar uniformity."—"(*Idemque dici possit de uniformitate illà quæ est in corporibus animalium.*") More than one hundred and fifty years have elapsed since this opinion of the greatest of men was promulgated. During this period, what immeasurable advances have been made in all the sciences! Astronomy has approximated perfection; in every department of the mechanical art the scale and scope of progress are as vast, as its character and attributes are substantial

and solid; the laws of electricity and magnetic phenomena have been unfolded; chemistry has opened new fields of investigation and established new laws; and even the complex phenomena of meteorology have been partially disentangled. But while all this activity is displayed in connection with the advancement of the sciences which appertain to inanimate objects, does the spirit of the age withhold its influence from the science of *life*? Has the labor of its cultivators been barren and unproductive? Have they unfolded none of the laws of organization? In short, has that science, to the pursuit of which *we* are devoted, stood still, while its kindred of the great family of knowledge have advanced with gigantic strides? Shall we conclude that because charlatanical devices spring up, and continue to attract the heedless multitude by their cunning delusions, that the professors of legitimate science have been idle? Assuredly not. There is, in truth, no branch of knowledge which, in the conviction of those who are capable of judging, has of late years made advances more rapid and more solid than medicine. In acquaintance with the intimate phenomena of diseased processes and products, we, of the present day, have vastly outstripped our immediate predecessors; in the facility with which we recognize the existence, and in the accuracy with which we define the characters, of *maladies* during life, we are incomparably their superiors; in the great object of our art, that of mitigating the sufferings and controlling the ravages of disease, our capabilities have notoriously become increased and invigorated. But, above all, we have the more substantial proof that our slow and steady labor tells, in the grand truth, that the mean duration of human existence is on the increase.

But while we thus bear testimony to the great and important progress which the science of medicine has made, yet, it must be admitted by every candid inquirer, that all the zeal and industry of its cultivators have failed to establish on a solid and enduring foundation, any grand and comprehensive law of the animal economy, such as must have been contemplated by Newton in the extract which was given at the commencement of this address. Many subordinate principles of the science of organization have been based on a secure foundation; and

many more, which were at first doubtful, are daily receiving fresh confirmation; but they have been unsuccessful in unfolding laws of the *highest* degree of generality, such as have rewarded the labors of the students of physical science. Are we to infer from this fact, that the Creator of the universe, who has manifested the severest and most refined geometry in the construction of inanimate nature, has abandoned all law and rule in the construction of organized beings? Was Newton mistaken when he prophetically announced that, similar uniformity must characterize the structure of animated nature? Certainly not. In the ever-varying conditions of the animated world, a very superficial glance will display to us a certain degree of regularity and derangement; and the more attentively we investigate the relations which its changes present, the more stable and definite is the assurance we obtain, that they are all harmonized and controlled by *fixed laws*, which are but simplified expressions of those conditions of action which the Creator has imposed upon organized no less than upon inorganic matter.

Impressed with these ideas, I have thought, that the causes which have impeded the advancement of the science of life, and the consequent improvement of the art of medicine, together with those which may have conduced to its recent progress, would form an appropriate topic for to-day's consideration. It is well to premise, that the negative and positive sources of advancement are too numerous to allow of more than a cursory notice of some of the more prominent ones.

As vital phenomena have excited the attention of all classes of men, from the earliest ages of the world, and have probably formed the most ancient and universal theme of conversation and speculation, both with the learned and unlearned, we should naturally expect, that medicine ought to be one among the most advanced of the sciences; because, for thousands of years, it has been the object of the labors of so many intelligences. Unfortunately it is not so; and the reasons are sufficiently obvious to the reflecting mind. When we consider the peculiarly intricate conditions connected with every physiological problem—the large advances that must be made in many capital portions of knowledge, before one successful step can be made in this, we readily perceive, that a thousand complicated inquiries beset

the investigator at the very threshold of physiology, stimulating him to ardent investigation, and inspiring him with wholesome caution. Indeed, the complication of the processes carried on in the organized kingdom, the widely-extended circle of their agency, and the ever-varying results of their compound influences, appear to have been almost too much for the mind to comprehend as a whole; and the powers of reason have been bewildered in the inextricable labyrinth of causes and effects—of actions and reactions. This is no fault of its cultivators, who have comprised in their list the highest and most varied talents and industry, but of the inherent complexity of the subject, and the infinite multitude of causes which are concerned in the production of every, even the simplest, vital phenomenon.

But there are other reasons why medicine cannot possibly advance at a pace equal to that of the other branches of science. It is true, a vast number of observations have been made on the phenomena of life; but they are, at the same time, *observations* in the most restricted sense of that word. We observe the phenomenon presented to us, but cannot modify and vary it at pleasure; we cannot reproduce it at will. In a word we cannot have recourse to *experiment*. We are hence compelled to register facts; and, as Sir William Herschel has very well observed, we resemble a man who hears now and then a few fragments of a long history related at distant intervals by a prosy and unmethodical narrator. In recalling to mind what has gone before, he may occasionally connect past with present events; but a host of circumstances omitted or forgotten, and the want of connection, prevent his obtaining possession of the entire story. Were we allowed to interrupt the narrator, and ask him to explain the apparent contradictions, or to clear up any doubts on obscure points, then might we hope to arrive at a general view. The questions that we would address to nature are the very experiments of which we are deprived in the science of organization. The obstacles which interpose themselves to the prosecution of this science, result more from that difficulty in the ascertainment of facts and the observation of phenomena, which is occasioned by the peculiar conditions of living beings, than from any incapability on the part of these facts and phenomena to be comprehended within laws as stable

and as definite as those of the purely physical sciences. Thus, although the structure of the human body has been carefully and minutely examined by so many thousands of Anatomists, how many points are still uncertain, and how much still remains to be discovered! The difficulties which beset the path of the physiological inquirer are still more appalling. The complexity of the combinations in which vital phenomena present themselves is such, as to baffle all attempts at analysis, while their dependence upon one another is so intimate, as almost entirely to preclude their separate examination. "Were we able to ascertain the changes which take place in the interior of the living body, with the same ease that the astronomer watches the motions of a planet, or the chemist observes the formation of a precipitate,—the very multiplicity of these changes, and the variety of conditions under which they occur, would be of essential service in the determination of their laws, instead of being, as at present, sources of doubt and embarrassment. The chemist, when desirous of establishing to which of the ingredients in a given mixture a particular effect is due, places each separately in the conditions required to produce the result: but the physiologist finds that the attempt to insulate any one organ, and to reduce the changes performed by it to definite experimental investigation, necessarily destroys, or considerably alters, those very conditions under which alone its functions can be normally performed. Take away an important and essential part of a living being, and it ceases to exist as such; it no longer exhibits even a trace of those properties which it is our object to examine; and its elements remain subject only to the common laws of matter. We cannot, like the fabled Prometheus of old, breathe into the lifeless clay the animating fire; we cannot, by a judicious and skilful arrangement of those elements, combine them into new and artificial forms so as to produce new and unexpected phenomena."—(*Carpenter's Gen. et Comp. Physiol.*, 2d ed., p. 3.)

Moreover, all the phenomena of life are, at present, almost wholly removed from the logic of *quantity*. Now, so far as the logic of quantity is applicable, so far are we certain of our conclusions, as certain at least as we are of our own existence. But when this logic cannot be applied, our conclusions are no

longer such as *must* be—no longer follow from our premises as necessary consequences ; but are only, for the most part, such as *may* be ; that is to say, have no more than that degree of probability which arises from the evidence we have of the truth of the phenomena or events, forming our premises. In all knowledge depending on mere observation, what we know is grounded on our own observation and experience, or on that of others. What we ourselves observe, we too often observe very imperfectly ; or do not understand, when observed. But phenomena or events, the knowledge of which we are obliged to receive at second hand, on the *testimony* of others, and which may have been observed through the distorted medium of ignorance or of prejudice, may even have been wilfully misrepresented—of these we have a still less assurance. If the phenomenon or event be of frequent occurrence, or if its nature be such, that it is capable of being brought under our own observation ; in order to remove our uncertainty, we endeavor to observe it ourselves. Such is the method we pursue in obtaining all that knowledge which is the result of mere observation. The different events succeed one another, but we know not wherefore ; we see not their mutual connection. We believe that one phenomenon will, *probably*, follow another ; because the one has generally followed the other, or because of some other probability ; but we cannot discover that *necessary* connection between the two phenomena, which so irresistibly leads us to determinate conclusions, where we can apply the laws of quantity.—(*Prout. in Bridgewater Treatise.*)

In medicine, the objects to be examined are, beyond comparison, infinitely more variable and complex than in any department of physical science. And as the complicated phenomena of health and disease are made up of elements which allow of no exact measurement, the description must necessarily be clothed in the imperfect and inexact language of the senses. The imperfections of medicine as a science are consequently inherent in the subject itself.

The physician, unlike the mathematician, is not the creator of his own science ; unlike the astronomer, he has no simple relations of matter to deal with ; he cannot, like the chemist, make any two things which he examines or uses identical ; the

objects of his study are more variable than the winds and tides, and the materials with which he works infinitely more difficult to adapt to their uses than the matter which the mechanic or the engineer presses into his service. In all his preliminary studies (with the exception of inorganic chemistry), in all his original inquiries, in all his practical applications, he encounters the varying effects and complicated phenomena of life. The human frame unites within itself all that is most wonderful in contrivance and most elaborate in workmanship. Its structure as much surpasses the most skilful work of man's hands, as its functions do the play of his most ingenious mechanism, and its products the results of his most refined chemistry. That which he knows bears no proportion to that of which he is entirely ignorant; what he sees, he sees but darkly; much of what he does, he does but guessingly. He seeks for causes, but they elude his search; they baffle him at every turn; he strives, as it were, to seize them by force, but the violence which he uses defeats itself, and the tortured body dies that it may preserve the secret of its life. "Such, and so inscrutable is the body in health; disease surrounds it with new mysteries."—(Vide. *Brit. and For. Med. Rev.*, July, 1841.)

The aspect of living nature is every where characterized by boundless variety, by inscrutable complexity, by perpetual mutation. Our attention is solicited to a vast multiplicity of objects, curious and intricate in their mechanism, exhibiting peculiar movements, actuated by new and unknown powers, and gifted with high and refined endowments. In place of the simple combinations of elements, all organic structures, even the most minute, present exceedingly complicated arrangements, and a prolonged succession of phenomena, so varied and so anomalous, as to be utterly irreducible to the known laws which govern inanimate matter. How are we to find law and order in such diversified combinations? How are these anomalies to be explained? Must we say that nature is capricious? Assuredly not; for these anomalies are due to the action of the very causes which give rise to the other phenomena. An isolated observer, however much he may be supposed to be endowed with perseverance and sagacity, could not possibly arrive at a plausible explanation. Overwhelmed by the multiplicity of objects, and

lost amidst the complication of phenomena, he soon becomes dismayed by the magnitude and arduous nature of the investigation. He is ready to ask, shall we ever comprehend the nature of the subtle and pervading principle, by the agency of which all the wonderful phenomena of life are produced, and which, combining into one harmonious system so many heterogeneous and jarring elements has led to the formation of this exquisite frame, this elaborate machine, this miraculous assemblage of faculties? Perhaps, we are still far from the time when we shall be able to penetrate the dense veil which nature has thrown over the interior machinery of life, and discover the long-sought clew to the mazes of this perplexing labyrinth. It may even be said to be problematical whether this time will ever come. But though the complete solution of the problem may remain unattainable, its partial solution may still be anticipated; indeed, the effort to understand the phenomena of the universe is still the highest, as it is the eternal goal of all scientific investigation. Whatever difficulties may have hitherto opposed the development of the science of medicine, it has unquestionably made very notable progress since the end of the last century; and it now advances with a slow and steady pace. Future ages will erect the edifice, of which we have laid the foundations; and we may already say, that the general plan is simple, and that its apparent complexity arises from the close connection of the parts with each other,—a connection so intimate, that it is difficult to circumscribe the limits of the phenomena. The more deeply we penetrate into the mysteries of nature, the more harmony do we detect; the more do we perceive the connection of phenomena, which, severally and superficially regarded, seemed long to resist every attempt at co-ordination and arrangement; the more do we see simplicity, order and beauty.

With these reflections, permit me to pass on to the consideration of the causes which have conduced to the recent advancement of medical science, and its kindred departments.

1. One of the most efficient causes of the recent improvement in medical science seems to me to be the virtual abandonment of all *exclusive systems*. Since the period when men, shrinking from the toil of severe observation and induction, yielded to the easy pleasure of fabricating *à priori* doctrines of disease,

systems upon systems have followed each other in endless succession, interchange and admixture. Could such systems advance true knowledge? The answer becomes easy, when the manner in which they were conceived, is for a moment considered. A few facts are observed,—it might be one, it might be two, or, with the more sober of the founders of systems, a somewhat greater number; these facts may have been observed carefully and accurately, as far as the state of general acquirement, existing at the period, permitted. But all the accuracy in the world could not increase their number—they remained but one, or two, or at best a very few. Now, in the characters and relations of this fact or these facts, a quick apprehension fancied it caught some ruling principle: the principle thus presumed to be discovered, was forthwith generalized, and made the basis of a theory, whereto all the phenomena of disease were to be referred. Disregarding the first principles of just reasoning, these men, ambitious of scanning Nature's mysteries without moving from their easy chairs, succeeded too often in persuading the multitude that they *had* in their theory, laid bare the secret engine whereby the phenomena of disease were worked. The general hypothesis was thus established with the pretensions and weight of demonstrated truth. Meanwhile facts went on accumulating, some supporting (either really or apparently), others as distinctly opposing, its provisions. All opposing facts, were, in the first enthusiasm for the new doctrine, set aside. But facts of this conflicting order still went on,—they were noticed in so many quarters, their learning and importance were urged by so many persons, that an impression at length arose as to the possible fallacy of the doctrine; symptoms of declining veneration for their doctrinal idol might, by a shrewd spirit, be traced in the multitude. At such a conjuncture there was ever a new theorist, a new dealer in first principles, to be found; seizing the propitious moment, he started the doctrine to which his reveries had led him, and had the joy to see it raised to the just-vacated pedestal. Such has been the course of things from time immemorial,—from one false system to another, men have wandered in a state of perpetual transition. The unsatisfactoriness of all such attempts, and the necessary consequence of this, a constant alteration and suc-

cession of inappropriate hypotheses, were indications of the progress which was going on towards a more genuine form of the science.

But the emptiness of all systems founded upon *à priori* reasoning, might be inferred from certain *primâ facie* peculiarities, which characterize them all. While the phenomena of nature and the laws governing them have been, and will ever continue, immutable, these systems invariably bear the stamp of certain continued and changeable circumstances. In many of them may distinctly be found the impress of the marvel-worship and superstition of the dark ages, in which they were conceived; in others, the temporary impulse given to some one of the collateral sciences may be traced; in others, the peculiar social circumstances, amid which individuals have been placed, have had a striking influence upon the theories they have originated. In all—the finite, the temporary, the unstable qualities of even the brightest of man's conceptions, as compared with the infinite, the enduring, the stable attributes of nature and her laws, stand forth in impressive contrast. It would be easy to show that every system in medicine may, in respect of its origin, be placed in one or other of these categories; but I need not pause to illustrate this point, as your studies must have afforded numerous examples of the correctness of the opinion.

Rejoice, then, gentlemen, you who start upon the career of medicine, that the day of exclusive systems has, practically speaking, passed by,—at least among the most intelligent members of the profession. Rejoice, that we are neither Pneumatists, nor Archæists, nor Animists, nor Vitalists, nor disciples of the Jatro-chemical or Jatro-mathematical creeds, nor Brunonians, nor Solidists, nor Humoralists, nor Broussaisians, nor Rascorians. Rejoice that, instead of all this, our boast is to be simple observers of Nature, who seek by patient and close investigation to ascertain the facts of our science. The history of all sciences warrants the assertion, that all myths concerning imponderable matters and special vital forces inherent in organized beings, only render views of nature perplexed and indistinct. Reason, boldly and with increasing success, now seeks to break down the ancient forms, by means of which, as with mechanical contrivances and symbols, man has still been wont

to strive to obtain mastery over rebellious nature. Let us, therefore, hail the abandonment of exclusive systems in medicine, as a propitious omen. Even the most perfect of the physical sciences, anatomy, had to pass through a similar cycle of unsatisfactory hypotheses, before any great positive discoveries were fixed and perpetuated in conspicuous and lasting truths. Well has it been said, by a talented writer of the present day, that it is "a condition of our race, that we must ever wade through error in our advance towards truth; and it may even be said, that in many cases we exhaust every variety of error before we attain the desired goal. But truths reached by such a course are always most highly to be valued; and when, in addition to this, they may have been exposed to every variety of attack, which splendid talents quickened into energy by the keen perception of personal interests can suggest; when they have revived undying from the gloom of unmerited neglect; when the anathema of spiritual, and the arm of secular power have been found as important in suppressing, as their arguments were in refuting, them—then they are indeed irresistible. Thus tried, and thus triumphant, in the fiercest warfare of intellectual strife, even the temporary interests and furious passions which urged on the contest have contributed in no small measure to establish their value, and thus to render these truths the permanent heritage of our race. Viewed in this light, the propagation of error, although it may be unfavorable or fatal to the temporary interests of an individual, can never be long injurious to the cause of truth. It may, at a particular time, retard its progress for a while, but it repays the transitory injury by a benefit as permanent as the duration of the truth to which it is opposed."—(Vide. *Babbage's Ninth Bridgewater Treatise*, p. 28.)

2. In the second place, the vigorous and healthy tone of recent medical progress, may be traced to the declining veneration for what have been termed "*authorities*" in medicine. It follows, as a natural consequence of the intellectual, and even physical, inequality of men, that some individuals become distinguished for superiority of scientific attainments. To the decision of such men, on points of science, respect is most unquestionably due. But daily experience as unquestionably

shews, that this respect may be carried so far as to amount to a positive evil. The grateful sense of their scientific worth, the acknowledgement of their mental superiority, too habitually sink into an overwrought reverence for all they say or do. That confidence which should be bestowed with gravest caution, and which should never place its objects beyond the pale of severe scrutiny—which ought to act, by the stimulus it afforded to intellectual exertion, as a means of advancing science, is, on the contrary, lavished on these men with careless prodigality, and raises them above the reach of criticism. The merest speculations, if sanctioned by them, pass current as established truths. In other words, these persons become “*authorities.*” The results—obtained by men who have not acquired this rank, no matter by what patient investigation they may have been elaborated, no matter with what conscientious industry facts may have been sought for their foundation—run the risk of being treated as absurdities, should they chance to clash with the dictum of an “*authority.*” Is it not obvious that any spirit, tending to give vigor and permanency to a domination such as this, must be in its nature bad; and that every effort should be made to establish in its room the love of truth for its own sake, and devotion to independent inquiry?

But it must not be imagined, that while resistance to the despotism of authorities is proclaimed, a yet worse despotism is to be admitted in its place,—I mean the despotism of untried, unproved men. As there seems to be a tendency to yield to this novel species of tyranny, it may not be improper to tarry for a moment with its consideration. The great instrument of this tyranny is one, by means of which, the most important additions to scientific pathology have, of late years, been made,—I allude to the microscope. While conceding that it is almost impossible to over-estimate the sterling value of the discoveries effected through its application by judicious men to the minute study of diseased processes, we may be permitted to deprecate the proneness to accept, without scrutiny, statements on points of microscopical observation, no matter how untried, how unknown, the person who advances them, may have previously been. Some inexperienced observer, zealous, laborious, and conscientious, it is not doubted, but not yet grounded in habits

of severe observation, and eagerly desirous of notoriety, applies himself to the use of the microscope. Forthwith he discovers some cell, some nucleus, or some nucleolus, some molecular attraction or repulsion, which had eluded the less keen survey of his predecessors. Charmed with his success he, at once, without waiting for a series of results confirmatory of the first, publishes his discovery. Nothing, under the circumstances, could be more natural; nor, perhaps, more harmless, did he stop there. But this is seldom the case. Appearances so obvious, he reasons, cannot be without their influence on the clinical phenomena of disease,—a new view of some of these phenomena occurs to his fancy. He gives this forth with such measure of plausible illustration, as he can command. The whole looks simple at first, then possible, soon probable, and eventually, certain, to persons, who from various causes have not the means of testing the accuracy of the original observation. The evil does not rest even here. Among these persons, some are struck with the idea that so bright a discovery should not be lost to therapeutics,—they modify the treatment of some disease in harmony with the new principle; and, persuaded beforehand of the perfect correctness of that principle, invariably make the change with the “happiest effects.” But, meanwhile, other microscopical observers, equally sagacious and more cautious than the first, turn their attention to the original starting point in the series of changes. They discover, and they *prove*, that the leader in this revolution was in error,—that the cell, or the nucleus, or the nucleolus to which he had given a local habitation and a name, are imaginary; that the molecular attraction or repulsion are mere creatures of an active fancy. The anatomical or physiological fact being inaccurate, the pathological and therapeutical notions, founded upon it, are of necessity stamped with error to the second or third powers. But these doctrines have, perhaps, meanwhile been sent forth in goodly type, and may continue to influence the clinical practice of the inexperienced, long after the primary mistake has been detected and exposed. This illustration is sufficient to show, what incalculable mischief must result from the hasty publication of inaccurate observations on many subjects, in which, it is infinitely more difficult to correct an error or false conclu-

sion, than in the example just given. Fortunately, the remedy for both of the evils we have glanced at, is sufficiently obvious: neither the "*authority*," nor the untried man, are to be taken at their words. They are, in each instance, to be asked for their proofs,—they must describe any alleged appearance in such a manner as to furnish evidence of their own accuracy—their descriptions must place the reader, as far as is possible, in the position of the observer, and put him in possession of grounds for forming an independent opinion.

3. In the third place, the progress of sound medical knowledge has arisen from the adoption of greater caution in the application of conclusions founded upon analogy. No one can dispute the great value of analogy as an instrument of reason; some of the most obscure points in physiology have been elucidated by labors of Naturalists, in the fertile field of comparative physiology. Thus, Dr. Edwards was enabled to arrive at many important conclusions with respect to the influence of external agents on the phenomena of life, by subjecting reptiles to treatment which would have been fatal to animals of a higher order. Yet such reasoning must be cautiously applied; for, in truth, there is scarcely any proposition, be it ever so absurd, that may not be quasi-proved by analogical argument. By reasoning thus conducted it may be shown, for instance, that the circulation of the blood in man is carried on independently of any of the motor forces, commonly recognized as accomplishing that function. For, first, in monsters deficient in brain and spinal marrow, the circulation goes forward; consequently, the nervous centres are without influence on the phenomenon. Secondly, in animals without a heart, there is, nevertheless, a very excellent vascular circulation: therefore the heart is useless in the maintainance of the function. Thirdly, experiments on mammiferous animals show that, under certain circumstances, the circulation is sustained by the simple action of a heart, without aid from the arteries, capillaries, or veins, or from muscular pressure, or from the suction exercised by the right auricle, or by the chest; therefore the arteries, capillaries, and veins, may be dispensed with in carrying on the circulation. Hence, to resume, reasoning of this kind would lead to the absurd conclusion, that the continuation of the blood's movement

depends neither on the heart, arteries, or veins, nor on nervous influence, nor on aspiration exercised by the thorax or right cavities of the heart.

Other sciences have, like our own, felt the baneful influence of this method of establishing conclusions. Voltaire cuttingly ridicules the pretensions of this class of reasoners. In one of his satirical tales, *Micromégas*, an imaginary inhabitant of Sirius, is supposed to make a voyage of discovery through the solar system in company with a denizen of Saturn: they philosophize as they go. Approaching the planet Mars, *Micromégas* and his companion plainly descried two moons acting as satellites to that body,—moons which have certainly escaped the ken of terrestrial astronomers. “I know perfectly well,” continues the author of the tale, “that Father Castel” (an astronomer of the time) “will write, and write sufficiently pleasantly, too, against the existence of these two moons; but I appeal against his decision to logicians, who reason from analogy. These excellent philosophers are perfectly aware how difficult it would be for Mars—a planet so far removed from the sun—to get on with less than two of these satellites.”—(*Micromégas et l'Histoire des Croisades.* Lond. 1752.)

But because the indiscreet use of analogy is positively detrimental to the advance of science, it by no means follows, that the use of analogical argument is to be discarded. But it is to be employed cautiously, and solely as a means of suggesting, and pointing to, questions deserving of investigation by the only sound method—that of direct observation. With these limitations, analogy is an invaluable guide to the physician as well as the naturalist.

4. Another source of recent improvement in medicine is, an increasing tendency in the minds of men, at the present day, to ascertain the intimate nature of the phenomena of diseases, and the *laws* governing their origin and progress; instead of speculating on the *final causes* of diseased actions. To ascertain the laws which govern the phenomena of disease is the goal of rational and legitimate pathological investigation. We are aware that it has been said, that the knowledge of these laws is of little value; that unless their causes are fathomed, no greater advance is in reality made than when they were

unknown; that no practical inferences, no enlarged notions of the nature of disease follow from their establishment. No greater fallacy could be imagined. What if it can be ascertained by observation repeatedly undertaken and cautiously conducted, that a given disease arises under a certain combination of circumstances;—that it affects the system generally in an assignable way, before it exercises its influence on particular parts;—that it affects certain of these parts and none others, in a certain sequence, and in none others;—endures for a certain length of time, which may, with slight oscillations, be predicted;—if it be ascertained in the same way that a fixed proportion of persons attacked with this malady will die, and that the age, sex, habits of life, assign beforehand to any given individual, with a great share of certainty, his place in one or other of the two classes,—of those to die, or those to live:—if all this can be done by the well-devised search after *Laws* (and it has been done in respect of several diseases,) will it continue to be affirmed that the practical utility of their discovery is limited—that they do not vastly widen the field of true acquaintance with disease?

But there are certain men who deem that their mental endowments are of too high a stamp to be wasted on the patient toil of observation, and the induction of laws from its results. Let such men survey the field beyond their own. Let them look to the history of other sciences, and see how the illustrious among their followers thought of the investigation of *Laws*. Let them regard the vast intellect of Newton, disdaining all petty scholastic disputations regarding causes; and observe him devoting all his energy to establishing the conditions of the great Law he had discovered. Let them remember that, “all the human mind has produced—the brightest in genius, or the most continuous in application—has been lavished on the details of the law of gravity.”—(*Babbage. Ninth Bridgewater Treatise.*) And the great philosophers, who follow now in the path of that immortal genius—are they engaged in the struggle to detect final causes? No; they feel that many of the discoveries of the present day point to a yet more general law than that of gravity, and expend all their wisdom in the effort to hasten its establishment. Let the medical inquirer, discontent-

ed with the search after laws, because it affords not span commensurate with his powers, ponder upon all this,—and if vanity has not placed him beyond the reach of humiliation, he must shrink abashed from the contemplation of his tiny efforts to unveil the mystery of causes.*

5. So far we have spoken of the advance of Medical Science, as the result of the surrender of systems and methods of reasoning stamped, as it appears to us, with error. Herein lie what may be termed the *indirect* sources of progress. The *direct* cause is none other than the more general adoption of close OBSERVATION and INDUCTION in clinical and pathological research. Through the earnest application of these great instruments of progress in all sciences, all recent solid advancement in medicine has been effected. It has of late been understood in medical science, as it has long been understood in other sciences of observation, that:—"To begin with self-evident principles, to advance by timorous and sure steps, to review frequently our conclusions, and examine accurately all their consequences—though by these means we shall make both a slow and a short progress in our systems—are the only methods by which we can ever hope to reach truth, and attain a proper stability and certainty in our determinations."—(*Hume's Essays—Academical and Sceptical Philosophy*. Part I.)

6. Lastly: It is to the growing habit of counting facts—to the use of what has been termed the numerical method—that must be traced in great measure, the accuracy of existing knowledge in pathology. We are aware that this is not an

* (Note.) These remarks refer exclusively to *pathological* investigations, and not to physiological and anatomical researches. Indeed, final causes are involved in our fundamental conception of organization:—the parts have a *purpose*, as well as a law;—we can trace a determinate *end*, as well as laws of causation. The application of this principle, has, in the hands of Cuvier and others, contributed largely to the advancement of physiology, zoology, and comparative anatomy. But, when it is attempted to be applied to *diseased* processes, interminable error and confusion must arise. Can any one assign a *purpose* to any given diseased action? Has any organ a *function* other than a normal and healthy one? It appears to me, that physicians have not kept this fundamental distinction between physiology and pathology in view, with sufficient clearness and steadiness. Hence, the vast number of crude hypotheses and vague conjectures, which have been framed to account for the *objects and ends* of various diseased processes.

universally-admitted position ; there are persons who oppose the application of figures in the settlement of questions of all kinds connected with pathology, etiology and therapeutics, on the ground that morbid conditions are too complex and too varying in character to admit of being represented by numbers : others hold the contrary opinion. The modes of procedure of the two parties may thus be sketched. An author, belonging to the one, simply states that he has treated a given malady in a certain manner with such general effects, as induce him either to recommend that a similar line of conduct should be uniformly pursued in its management ; or to dissuade others from following his example. The writer, who has faith in the application of figures, tells his readers how many cases he has treated—in how many instances he has relieved—in how many instances he has cured, and in how many instances death has occurred. The natural reflection upon the former mode of proceeding is, that for the accuracy of his verdict we must trust blindly and implicitly to the author ; and the nature of that verdict will depend, probably, more on the character of the man, than of the facts which are presented. It is perfectly clear, that the same result will be differently viewed by him, according as he is of sanguine or desponding temper, vain or modest, cautious or rash in his judgments ;—according as he is ready to accept slight evidence or requires full demonstration. He may fancy that he *always* does good ; or that he *frequently* does good ; or that he (which is rare) *seldom* does good ; or that he (which is still rarer) *never* does good ;—and what fair grounds are there, whereon his readers may either question his accuracy or gainsay his determinations ? On the other hand, according to the second mode of proceeding, the temper and character of the observer have no influence on the general result. Figures have nothing to do with temperament ; the numbers 1, 10, 100, 1000, have but one meaning for all mankind. Does not the superiority of conclusions obtained upon the latter, to those set forth upon the former, plan, as guides to practice, appear clear and self-evident ? In point of fact, no man can form a correct estimate even of his own success in the treatment of any disease, unless by counting the instances of his failure and the contrary. Moreover, how else can the ex-

perience of one observer be added to that of another ; how else can the experiences, acquired at different periods and in different countries, be made to take part in one general result ? The valuable results which have already been attained, through the cultivation of the general statistics of disease, as it affects large populations, warrant the highest anticipations in relation to the assistance which medicine will eventually receive from this source. Of what problems, regarding the health of man, may we not anticipate the solution, when the diseases of various climes, properly registered, may be compared with each other ! With what certainty shall we be enabled to establish, not only the influence of civilization generally on disease, but even of particular modes and forms of social progress ! In the history of the more demonstrative sciences, it will be found that it is the introduction and use of accurate numerical measures, that forms the prelude to the epoch of rapid advancement. The theory of gravitation in astronomy, that of definite proportions in chemistry, and that of luminiferous undulations in optics, are all numerical theories, susceptible of mathematical expression.

From these several considerations, I think we may safely affirm, that modern medical science is based on a secure foundation, and that it will ultimately attain to a degree of exactness which will be sufficiently satisfactory to the mind. We have just entered upon the *inductive* epoch in medicine. This is the period for collecting facts, for multiplying observations, for establishing the basis of wider and higher generalizations. Nor is there any observer, however unpretending, who may not add to the stock of ascertained facts ; so varied and inexhaustible are the stores of nature. The humblest contributors may rest assured, that they are imperceptibly raising an enduring structure of scientific truth.

Unfortunately, by the side of this scientific system, another is seen growing—a system of unproven, and, in part, entirely mistaken empirical knowledge. Embracing but few particulars, this kind of empiricism is the more presuming, because of its utter ignorance of the facts by which it is assailed. Shut up within itself, it is unchanging in its axioms, and arrogant, like every thing else that is restricted ; whilst enlightened sci-

ence, inquiring, and therefore doubting, goes on separating the firmly established from the merely probable, and perfects itself daily through the extension and correction of its views. Instead of investigating the medium point about which, despite the apparent unfettered aspect of nature, all phenomena oscillate within narrow limits, it only takes cognizance of the exceptions to the law; it is ever disposed to presume the train of natural sequence interrupted, and to overlook in the present all analogy with the past. Such a system opposes every thing like those comprehensive views which raise our conceptions of the dignity and grandeur of nature, by the discovery of universal laws,—laws that reign in the most delicate textures that meet us on earth, no less than in the Archipelagos of thickly-clustered nebulæ which we see scattered through the awful depths of space.

The general prevalence of this empiricism may be traced to the present imperfect state of the science of life. The notion of life, and of vital forces, is still too obscure to be steadily held. We cannot connect it distinctly with severe inductions from facts. In the language of a distinguished historian of science;—“We can trace the motions of the animal fluids, as Kepler traced the motions of the planets; but when we seek to render a reason for these motions, like him, we recur to terms of a wide and profound, but mysterious import; to virtues, influences, undefined powers. Yet we are not on this account to despair. The very instance to which I am referring shows us how rich is the promise of the future. “Why,” says Cuvier, “may not natural history one day have its Newton?”—(*Ossem. Foss. Introd.*) The idea of the vital forces may gradually become so clear and definite as to be available in science; and future generations may include, in their physiology, propositions elevated as far above the circulation of the blood, as the doctrine of universal gravitation goes beyond the explanation of the heavenly motions by epicycles.”—(Vide. *Whewell's Hist. of Inductive Sciences*, vol. 3, p. 404, 405.)

And of all this, gentlemen, what is the object and what the end? None other than the discovery of truth, and the application of this truth to the relief of human suffering. Such are the aims of him who enters, in the right spirit, upon the study of

medical science. And can there be a nobler combination than that which practice opens to your view,—the intellect keenly laboring for the benefit of your fellow-men, and the affections deeply sympathizing in the results of the labor? And ought it not to be a high privilege to belong to a profession, of which such is the exalted mission? Is it not vividly inspiring,—ought it not, in itself, to suffice to cheer you on amid toil, amid neglect, amid ingratitude, amid worldly struggles, to remember that, by taking a position in its ranks, you have acquired the power to think, to feel, to act, for the accomplishment of things so great,—that you have insured for yourselves the enjoyment of pleasures so pure? But if admission into this profession confer such privileges, and supply such foundation for the nobler orders of happiness, a return is looked for on the part of him who enters it. Of that profession he is required to bear himself as a worthy and high-minded member; and to maintain its dignity and elevate its position, as far as his individual character, conduct, and acquirements can conduce to that end.

And let me be permitted to close this address with words of calm though bright encouragement. Let me turn to those among you, who may feel diffident of your capabilities—who are disposed to recoil from the task before you, disheartened by the modest apprehension of intellectual deficiency, and say, that the “race is not to the swift, nor the battle to the strong.” It is to him who spares no toil;—who shrinks at no sacrifice of ease and momentary enjoyment;—who feels elevated by the grandeur of the end he aims at, and by his very energy spurns away difficulties, which otherwise must have thwarted and overcome him. Upon you, on the other hand, who form a higher and prouder estimate of your capabilities, who have within you the consciousness of power, I would impress the necessity of assuming and maintaining an iron and unbending will to work that power to its full;—I would bid you accept the augury of success your own bosoms have delivered, and let your lives be one unfaltering effort to fulfil the prophecy.